

heat derived from the vapor of the fluid heat transfer medium. --

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### **REMARKS**

Applicant has amended claims 1, 8 and 19, canceled claims 2-6, 9-12, 16-18 and 21-23, and added claim 24. Accordingly, claims 1, 7-8, 13-15, 19-20 and 24 remain pending in the application.

### **35 U.S.C. § 102& 103**

The Examiner rejected the originally-filed claims 1 and 6-7 under 35 U.S.C. § 102 as anticipated by Shinya et al. and also anticipated by Japanese Patent Publication No. 6-349722 ("the '722 publication"); claims 3, 5, 8 and 23 under 35 U.S.C. § 103 as being unpatentable over the '722 publication in view of Akachi et al.; claims 1, 6-8 and 23 under 35 U.S.C. § 103 as being unpatentable over Tsutahara et al. in view of Ahern et al.; and claims 3, 5, and 16-17 under 35 U.S.C. § 103 as being unpatentable over Tsutahara et al. in view of Ahern et al. and further in view of Akachi et al.

Applicant has amended claim 1 to include features generally recited in the originally-filed claims 3, 5 and 6, and amended claim 8 to include features generally recited in the originally-filed claims 16, 17 and 23. The new claim 24 includes the features generally recited in the originally-filed claims 1, 3, 5 and 7.

### **Claim 1**

Among other things, the method of claim 1 includes a feature wherein heat is

transferred to a liquid component of a fluid heat transfer medium in an amount sufficient to *evaporate* the liquid and produce a *vapor*, and heat is transferred from the vapor to a solid heat transfer medium, wherein the vapor is *condensed* back into a liquid phase. No such feature is disclosed in Tsutahara et al. Tsutahara et al. discloses a method which uses a *stirred liquid* in a hollow space of a heating stage to distribute heat. Nothing in Tsutahara et al. discloses or even suggests evaporating the enclosed fluid to produce a vapor. Neither Ahern et al. nor Akachi remedies this defect. Accordingly, no combination of Tsutahara et al., Ahern et al., and Akachi can produce the invention of claim 1.

Also, the method of claim 1 includes a feature of *circulating the fluid heat transfer medium* along at least one closed loop path located adjacent the solid heat transfer medium. Shinja et al. specifically *teaches away from* any such circulatory method:

*“The arrangement of the invention does not necessitate . . . any heat circulation path . . . and can be constructed inexpensively.”*

Shinja et al. at col. 6, lines 32-36.

Accordingly, for at least this reason, Shinja et al. cannot anticipate the method of claim 1, nor is it properly combinable with any other reference to produce the invention of claim 1.

Similarly, the ‘722 publication also does not disclose a feature of circulating the fluid heat transfer medium along at least one closed loop path located *adjacent the solid heat transfer medium*. Akachi does not cure this defect. Akachi discloses a heat source 6 with

closed loop path *embedded* therein. That is, if one could someone be motivated to combine the '722 publication and Akachi, then the mica heater 10 of the '722 publication would be replaced with the heater 6 of Akachi. This does not anticipate the invention of claim 1.

Also, claim 1 includes a feature of directing the fluid heat transfer medium toward the solid heat transfer medium using *capillary action*. Applicant respectfully submits that such a feature is not disclosed or suggested by Shinja et al., the '722 publication, or Tsutahara et al.

Accordingly, for at least the foregoing reasons, Applicant respectfully submits that claim 1 is patentable over any and all combinations of the cited prior art.

#### Claim 8

Among other things, claim 8 includes a feature wherein heating of a liquid component of a fluid medium *evaporates* the fluid heat transfer medium, and resultant *vapor* of the fluid heat transfer medium is condensed by the transferring of heat to a solid heat transfer medium. No such feature is disclosed in Tsutahara et al. Tsutahara et al. discloses a system which uses a *stirred liquid* in a hollow space of a heating stage to distribute heat. Nothing in Tsutahara et al. discloses or even suggests evaporating the enclosed fluid to produce a vapor. Neither Ahern et al. nor Akachi remedies this defect. Accordingly, no combination of Tsutahara et al., Ahern et al., and Akachi can produce the invention of claim 8.

Also, the system of claim 8 includes a heat source comprising a heater block having an upper surface facing towards a lower surface of a solid heat transfer medium, and *at least one of the upper surface of the heater block and the lower surface of the solid heat transfer medium define a singular groove in a closed loop shape*. Applicant respectfully submits

that such a feature is not produced by any combination of the '722 publication and Ahern et al. The device disclosed in the '722 publication does not include any groove whatsoever, particularly no singular groove defined by either the upper surface of the heater block and the lower surface of the solid heat transfer medium. Meanwhile, as discussed above, Ahern et al. merely describes a heater having a closed loop path embedded therein. That is, if one could someone be motivated to combine the '722 publication and Akachi, then the mica heater 10 of the '722 publication would be replaced with the heater 6 of Akachi, but there would still not be any singular groove defined by either an upper surface of the heater block or a lower surface of the solid heat transfer medium. Accordingly, no combination of the '722 publication and Akachi could produce the invention of claim 8.

Accordingly, for at least the foregoing reasons, Applicant respectfully submits that claim 8 is patentable over any and all combinations of the cited prior art.

#### New Claim 24

Among other things, claim 24 includes a feature that the solid heat transfer medium is heated ***substantially only by radiant heat*** derived from a ***vapor*** of a fluid heat transfer medium. Such a feature is not disclosed or suggested by any combination of the cited prior art.

At the outset, as explained above, Tsutahara et al. does not disclose or even suggest evaporating the enclosed fluid to produce a vapor for transferring heat. Accordingly, for at least this reason, claim 24 is deemed patentable over Tsutahara et al.

Moreover, Applicant respectfully submits that all of the embodiments shown in

Shinya et al. transfer some heat to the solid heat transfer medium by direct conduction from the heat source (see, e.g., Figs. 1, 2, 3, 5, 19, etc.) and/or by a liquid component of the fluid heat transfer medium (see, e.g., Figs. 1, 2, 3, 5, 7, 14, 16, 17, 18, 19, etc.). In no case is disclosed a system wherein the solid heat transfer medium 1 is heated ***substantially only by radiant heat*** derived from a ***vapor***, as in claim 24. Accordingly, for at least this reason, claim 24 is deemed patentable over Shinya et al.

Similarly, the solid heat transfer medium 2 in the '722 publication is clearly seen to rest directly on the heat source 10 and be heated thereby to transfer heat to the water L enclosed therein. The '722 publication does not show a system wherein the solid heat transfer medium 1 is heated ***substantially only by radiant heat*** derived from a ***vapor***, as in claim 24. Accordingly, for at least this reason, claim 24 is deemed patentable over the '722 publication.

### **CONCLUSION**

In view of the above arguments, Applicant respectfully requests that the application be reexamined and reconsidered, that claims 1, 7-8, 13-15, 19-20 and 24 be allowed, and that the application pass to issue.

In the event that there are any outstanding matters remaining in the present application, the Examiner is invited to contact Kenneth D. Springer (Reg. No. 39,843) at (703) 715-0870 in the Washington, D.C. area, to discuss these matters.


If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any over payment to Deposit Account No. 50-0238 for any

additional fee required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly,  
extension of time fees.

Respectfully submitted,

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**Version with Markings to Show Changes Made****In the claims:**

1. (Amended) A method of heating a wafer comprising the steps of:  
 generating heat to be supplied to the wafer;  
 transferring the heat to a liquid component of a fluid heat transfer medium in an amount sufficient to evaporate the liquid and produce a vapor;  
 transferring heat from the vapor of the fluid medium to a solid heat transfer medium,  
 [whereby] wherein the vapor is condensed back into a liquid phase; and  
 supporting the wafer on the solid heat transfer medium so that the wafer is heated with the heat which has been transferred from the vapor of the fluid heat transfer medium to the solid heat transfer medium;

wherein said step of transferring heat from the vapor of the fluid heat transfer medium to the solid heat transfer medium comprises directing the fluid heat transfer medium toward the solid heat transfer medium using capillary action; and

wherein said step of transferring heat from the vapor of the fluid heat transfer medium to the solid heat transfer medium further comprises circulating the fluid heat transfer medium along at least one closed loop path located adjacent the solid heat transfer medium.

8. (Amended) Wafer heating apparatus comprising:  
 a heat source;  
 a solid heat transfer medium on which a wafer is to be supported; and

a fluid heat transfer medium contained in an enclosed space located between said solid heat transfer medium and said heat source, [whereby] wherein heating of a liquid component of the fluid medium by heat from said heat source evaporates the fluid heat transfer medium, and resultant vapor of the fluid heat transfer medium is condensed by the transferring of heat to the solid heat transfer medium;

wherein said heat source comprises a heater block having an upper surface facing towards a lower surface of said solid heat transfer medium, and at least one of said upper surface of the heater block and said lower surface of the solid heat transfer medium define a singular groove in a closed loop shape, the fluid heat medium being contained in said singular groove;

wherein said enclosed space is delimited by said solid heat transfer medium such that the vapor of the fluid heat transfer medium is allowed to contact the solid heat transfer medium directly.

19. (Amended) The wafer heating apparatus of claim [16] 8, further comprising a tubular body disposed in [each] said [at least one] singular groove, the fluid heat transfer medium being disposed in said tubular body.

Claims 2-6, 9-12, 16-18 and 21-23 were canceled.

New claim 24 was also added.